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NUMBER 17

Proceedings of The Canadian Phytopathological Society

Sixteenth Session

June 20-24, 1949.

VANCOUVER
B.C.

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Editorial Committee
D. B. O. SAVILE
J. G. COULSON
B. J. SALLANS
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The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL
1948-1949

President

A. W. HENRY, University of Alberta, Edmonton, Alta.

Vice-President

D. J. MacLEOD, Laboratory of Plant Pathology, Fredericton, N.B.

Secretary-Treasurer

L. T. RICHARDSON, Division of Botany and Plant Pathology, C.E.F., Ottawa

Councillor

FERNAND GODBOUT, 152 Notre Dame St. E., Montreal, P.Q.

Jack Bocking

1920-1948

MINUTES OF THE SIXTEENTH MEETING HELD AT VANCOUVER, BRITISH COLUMBIA JUNE 20 TO 24, 1949

Business Sessions: June 20 and June 23

The business meeting was called to order by the President, Professor A. W. Henry, at 11.00 a.m., June 20. Professor Henry briefly addressed the meeting and referred to the position of the plant pathologist in human affairs. He stressed the importance of plant pathologists realizing their responsibility not only to the public, but also to their own profession and urged that we strive for and maintain the highest possible professional standards.

On behalf of the members, the President expressed sympathy with Mr. W. R. Foster in his recent bereavement and serious illness. He also referred to the untimely death of one of the members, Mr. Jack Bocking, and the members rose and observed one minute of silence in tribute to his memory.

The President expressed our pleasure that one of our members, Dr. F. J. Greaney, had been chosen as President of the A.I.C. for 1949-50.

The President expressed regret at the absence of the Secretary, L. T. Richardson, who had been forced to resign his post due to his leaving the country to accept another position. He requested J. W. Groves to take over the duties of acting secretary for this meeting.

To the various standing committees, chairmen of regional groups and to local special committee members of the Canadian Phytopathological Society, the President extended his thanks for efficient services rendered.

Mr. R. W. Marsh, Long Ashton Research Station, University of Bristol, England, brought greetings from colleagues in his country. These were reciprocated by the President on behalf of members of the Society.

Members in attendance at the first session were pleased to have present Dr. H. T. Güssow, first president of the Society, who since his retirement from the position of Dominion Botanist, has been living near Victoria.

It was moved by W. Newton, seconded by G. H. Berkeley, that the minutes of the previous meeting be adopted without reading since they had already been printed and distributed to members in Proceedings No. 16. Carried. It was pointed out by H. R. McLarty that the heading should have been "Fifteenth Meeting" rather than "Fifteenth Annual Meeting".

As business arising out of the minutes a report from A. R. Walker was read with reference to the formation of a Canadian Microbiological Council. It was evident from this report that no further action could be taken by the Society until a decision had been reached by the Can. Public Health Assoc. Laboratory Section. L. W. Koch suggested that Prof. Walker's committee should remain in office for another year to make any further arrangements. This was agreed.

The report of the Secretary-Treasurer was read by the acting secretary and adopted on motion by J. W. Groves, seconded by L. W. Koch.

The business meeting then adjourned.

Business sessions were resumed on Thursday, June 23.

The report of the nominating committee was presented by J C. Perrault. It was moved by J. C. Perrault, seconded by R. E. Fitzpatrick that the report be adopted. Carried.

The report of the Custodian of the Library and records signed by T. Johnson was read by the acting secretary. J. E. Machacek suggested that the library might be transferred to the Lethbridge laboratory, but after some discussion it was decided to take no action at present.

The report of the Editorial Committee was presented by B. J. Sallans.

The report of the Committee on Terminology was presented by A. W. Henry.

The report of the Resolutions Committee was presented by M. W. Cormack.

The following committees were appointed:

Publicity and Public Relations: A. J. Skolko, L. C. Callbeck, and W. A. Hodgson.

Resolutions: J. F. Hockey, G. W. Ayers, R. A. Ludwig, and W. F. Hanna.

Nominating: A. W. Henry, R. R. Hurst, D. L. Bailey, I. L. Conners, and J. C. Perrault.

Editorial: D. B. O. Savile, B. J. Sallans, J. G. Coulson, and A. J. Skolko.

Terminology: A. W. Henry and L. E. Tyner joint chairmen, D. L. Bailey, D. C. Buckland, W. L. Gordon, W. A. F. Hagborg, D. J. MacLeod, F. L. Drayton, and J. W. Groves.

Auditors: Mildred K. Nobles and J. W. Groves.

The following were appointed as regional representatives for 1949-50:

K. A. Harrison	Maritime Provinces
R. O. Lachance	Eastern Quebec
J. E. Jacques	Western Quebec
J. W. Groves	Eastern Ontario
A. A. Hildebrand	Western Ontario
J. E. Machacek	Manitoba
B. J. Sallans	Saskatchewan
L. E. Tyner	Alberta
N. S. Wright	B. C. Mainland
W. Jones	Vancouver Island

Following some discussion concerning the importance of regional group activities the following resolution was moved by L. W. Koch, seconded by L. E. Tyner. Be it resolved that the Secretary circularize all Regional Representatives, strongly urging that at least one regional meeting per year be held in each region; also, that where possible, regional meetings should include personnel from as many and as widely separated research units as feasible. Carried unanimously.

Under new business the first item for discussion was policy concerning the C.P.S. News. It was the consensus of opinion that the News served a valuable purpose and it was moved by N. S. Wright, seconded by H. R. McLarty that we recommend to the incoming executive that the news letter be continued. Carried.

Considerable discussion arose over the question of rates for student members. Difference of opinion developed as to whether technicians should be allowed to join as student members. It was argued that, especially in smaller laboratories, many of the technicians were very much interested and were able to contribute to the success of regional meetings and that other scientific societies admitted professionally untrained but interested persons to membership. It was opposed on the grounds that recognition of professionally untrained personnel as plant pathologists would lower the status of the profession. On the suggestion of J. E. Machacek it was agreed that the incoming executive should consider the advisability of amending the constitution by the creation of a class of associate membership to which technicians might be admitted and which would carry privileges of attending meetings and taking part in discussions but would exclude voting privileges.

It was moved by H. R. McLarty, seconded by L. W. Koch that an honorarium be provided by the executive of $20.00 for stenographic assistance to the Secretary and $5.00 for stenographic assistance to the President. Carried.

The following applications for membership were received: Richard Herbert Bagnall, W. Philip Campbell, Leslie C. Coleman, Bruce Wyatt Dance, Douglas A. Jamison, William Lobay, Donald S. MacLachlan, William Craik McDonald, D. L. McIntosh, Roy Leonard Millar, Stuart McGregor Pady, Edwin Arthur Peterson, Arthur J. Skolko, James Ernest John Thompson, John Arthur Thornton, Humphrey N. W. Toms, Edmund A. Turnau, V. R. Wallen, Jack M. Wilks. It was moved by H. R. McLarty, seconded by R. E. Fitzpatrick that these be officially admitted into the Society. Carried.

It was moved by D. J. MacLeod, seconded by W. Jones that the Secretary be instructed to send a letter of appreciation on behalf of the Society to Dr. L. T. Richardson for his services as Secretary, to express our regret at his departure and wish him success in his new position. Carried.

It was moved by J. C. Perrault, seconded by H. R. McLarty that a vote of thanks be passed to J. W. Groves for his services as acting secretary at this meeting. Carried.

It was moved by W. Jones, seconded by N. S. Wright that a letter of thanks be sent to Miss Doreen Jinks for stenographic assistance in the arrangements for the meeting. Carried.

It was moved by J. E. Machacek, seconded by H. R. McLarty that a vote of thanks be expressed to the retiring executive for their efforts on behalf of the Society during the past year. Carried.

Members of the Society appreciated the invitation to attend the meetings of the Pacific Division of the American Phytopathological Society, held at the University of British Columbia during the week preceding our meetings. A number of members availed themselves of this privilege and greatly enjoyed not only the regular sessions but as well their final banquet and field trip.

Dr. Henry then officially inducted the new president Dr. D. J. MacLeod who closed the meeting with a few appropriate remarks.

RESOLUTIONS

Whereas the members of the Canadian Phytopathological Society, on the occasion of the annual convention of the Agricultural Institute of Canada, June 20-24, 1949, have enjoyed excellent facilities and many courtesies;

Be it resolved that we extend our sincere gratitude to:

1. Our hosts at the University of British Columbia and the Vancouver Branch of the Agricultural Institute of Canada.

2. Dr. R. E. Fitzpatrick and his associates at the Dominion Laboratory of Plant Pathology at the University of British Columbia.

PROGRAMME

Following the opening business session three sessions were held for the presentation of scientific papers. Abstracts of the twenty-five papers which were presented are published in this issue of the Proceedings.

REPORT OF THE NOMINATING COMMITTEE FOR 1949-50

Requests for nominations were issued to the committee members on December 11, 1948. Ballots listing the names of the various nominees were issued January 14, 1949, the returns being as follows:

President — Dr. D. J. MacLeod
Vice-President — Dr. Wm. Newton
Secretary-Treasurer — Dr. L. T. Richardson
Councillors — Dr. R. Pomerleau, Dr. A. W. Henry

Dr. Richardson was obliged to withdraw his name from the 1949-1950 slate of officers. Nominations for his replacement were solicited immediately. Dr. A. J. Skolko was nominated and received the unanimous vote of your committee.

Respectfully submitted by the Nominating Committee.

T. JOHNSON
R. E. FITZPATRICK
D. L. BAILEY
J. C. PERRAULT
R. R. HURST (Chairman)

REPORT OF THE EDITORIAL COMMITTEE

The Proceedings (of the Fifteenth Session) of the Canadian Phytopathological Society covering the meetings at Guelph in June, 1948, were issued January 19th,

1949. The Secretary is to be commended for his energy and efficiency in gathering together and organizing the manuscripts and in its printing and distribution.

The proceedings include abstracts of 22 papers given at the meetings and 150 titles of papers published by members of the society during the two society years from June 1, 1946 to May 31, 1948. It is to be hoped that this list of publications can be brought up to date each year hereafter.

The committee feels that it would be advantageous to have the proceedings issued about the same time each year, i.e., in January, for uniformity. The practice of stamping the covers with the date of issue, begun with this proceedings, is recommended to future editorial committees.

Respectfully submitted,

R. C. RUSSELL
D. B. O. SAVILE
B. J. SALLANS (Chairman)

REPORT OF THE CUSTODIAN OF THE LIBRARY AND RECORDS OF THE SOCIETY

During the past year, 61 new accessions, chiefly reprints of scientific papers, were added to the library and indexed. The library, at present, is composed of 247 items in addition to numbers 1 to 16 of the Proceedings of the Society. A list of the chief contents of the library, apart from reprints, was furnished to the Secretary and distributed to members.

The future disposal of the library was discussed by correspondence with the Secretary. It was agreed that the library and records are of little use to the membership of the Society at the present time, but, in the absence of any constructive suggestion for their increased usefulness, it was thought that the present arrangement, that is, the location of the library and records at Winnipeg under my supervision, might be continued until the Society sees fit to make other arrangements.

T. JOHNSON

REPORT OF THE TERMINOLOGY COMMITTEE OF THE C.P.S.

The Terminology Committee appointed by the Executive during the past year (1948-49) to examine the terminology of Plant Pathology with a view to its improvement reports as follows:

The list of definitions submitted by the Committee on Technical Words to the 31st annual meeting of the American Phytopathological Society and published in Phytopath. 30, 361 - 368, 1940, based as it is on a considerable body of opinion, provided a valuable starting point for the work of the Committee.

After examining the afore-mentioned A.P.S. list opinion was divided regarding some of the definitions given and concerning the number of terms defined. It is therefore suggested that further study be given with a view —

(1) to improving some of the definitions in the A.P.S. list e.g.

immunization — the definition of this term should be clarified to indicate the nature of the process

infected — should be applied only to a living organism in which a disease process has been initiated by a pathogen.

inoculate —should be restricted to connote the application of a pathogen to a living organism.

klendusity — the word "inoculation" should be changed to "infection" and the last "infection" to "disease", in the definition given for this term.

pathogenic — might well be qualified to indicate different degrees e.g. "highly pathogenic"

resistance — would adopt the second definition given and discard the first; also would recognize different degrees of resistance

virulent — this term appears unnecessary if the suggestion under pathogenic is followed.

(2) to extending the list. There are many terms not in the list which should be included and defined e.g. antibiotic, ingression, epiphytotic, carrier, dissemination, transmission, facultative, disinfect, pesticide, systemic, predisposition.

The Committee recognizes the desirability of standardization in spelling and pronunciation as well as in definition and would encourage this standardization in future dictionaries.

Since international action is likely to be most effective in standardizing technical terminology, it is recommended by this Committee that the appropriate section of the International Botanical Congress be urged to take suitable action in respect to the terminology of Plant Pathology. A submission from this Society might well go forward to this Congress.

D. L. BAILEY
D. C. BUCKLAND
W. L. GORDON
W. A. F. HAGBORG
D. J. MacLEOD
L. E. TYNER
A. W. HENRY } Joint chairmen

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members:—

I beg to submit the following report as Secretary-Treasurer of the Society for the year ending May 31, 1949.

The fifteenth annual meeting of the Canadian Phytopathological Society was held at the Ontario Agricultural College, Guelph, Ont., June 21-24, 1948. The organization of Canadian microbiology was discussed, and the meeting approved a proposal to establish a Canadian Microbiological Council. It was decided that the scope of the Society should not be extended at the present time to include workers in fields related to plant pathology. A motion in favour of returning to the American Phytopathological Society as a Canadian Division of that organization was defeated. Three sessions were held for the presentation of scientific papers, the main topics being forest pathology, cereal diseases, and epidemiology of plant diseases. Abstracts of all papers were published in Proceedings No. 16 which were printed and distributed in January, 1949. This issue also included a list of papers published by members between June 1, 1946, and May 31, 1948.

An innovation this year was the publication of a news letter, the "C.P.S. News". By this means the membership was kept informed of the activities of members and of Regional Groups, as well as matters of interest to plant pathologists. Many of the Regional Groups were quite active this year, holding one or more meetings at which papers were presented by members or guests.

The total membership of the Society at the end of this fiscal year stands at 139. In addition, there are applications on hand from 18 prospective members.

The membership was notified in March of the slate of officers for 1949-50 submitted by the Nominating Committee. An alternative nomination for the office of Secretary-Treasurer was submitted by a group of members when the present incumbent found it necessary to withdraw his name from the slate. All offices were filled by acclamation and no election was necessary.

As shown by the attached financial statement, a favourable credit balance has been maintained, despite increased publication costs. In addition, we hold in reserve a $500 Victory Bond bearing 3 per cent interest.

Respectfully submitted,

L. T. RICHARDSON,
Secretary-Treasurer.

FINANCIAL STATEMENT
CANADIAN PHYTOPATHOLOGICAL SOCIETY

June 1, 1948 to May 31, 1949

Revenue :

Balance brought forward			$169.86
Fees :			
1947 - 48	$ 6.00		
1948 - 49	245.00		
1949 - 50	17.00		
1950 - 51	2.00		
		$270.00	
Interest on Bond		15.00	
Sale of Proceedings		4.00	
			$289.00
			$458.86

Expenditure :

Honoraria for stenographic assistance	$ 20.00	
Printing of Proceedings No. 16	153.36	
Stationery	26.80	
Postage	26.50	
Bank charges on current account	1.85	
Bank exchange on cheques	3.20	
		$231.71
Balance (on hand) May 31, 1949		$227.15
Additional Asset :		
Dominion of Canada 3% Victory Bond (Series K8Z32643)		$500.00

Audited and found correct,

(Signed) M. K. NOBLES

J. WALTON GROVES

ABSTRACTS OF PAPERS PRESENTED AT THE SIXTEETH MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

FURTHER OBSERVATIONS ON THE BUNCH-TOP (PURPLE-TOP) DISEASE OF POTATOES

D. J. MacLEOD, Dominion Laboratory of Plant Pathology, Fredericton, N.B.

The bunch-top (purple-top) disease is caused by a virus which does not correspond to the type strains of the aster yellows virus and is either an aberrant strain of it or an entirely different virus. The bunch-top virus has been transmitted repeatedly by stem grafting from potato to potato, tomato and five other *Solanum* species. The virus is tuber-borne but is rarely carried beyond the second generation following initial infection. Infected tubers become firm and hardened and sometimes remain dormant for 12 to 30 months after detachment from the affected plants. When these hard tubers are planted they generally remain intact in the soil during the entire growing season. The bunch-top virus has been recovered from tubers and seed pieces which survived in this hardened condition in the soil. When infected tubers are planted, some of the eyes fail to germinate, a few produce weak spindling sprouts which collapse in a few days, and others give rise to dwarfed stalks with enlarged nodes, axillary shoots with swollen bases, and sometimes aerial tubers. The leaflets show upward rolling and a marginal yellowing and purpling, especially near the base. The infected stalks are rigid and brittle and generally wilt and die 10 to 20 days after emergence. This secondary phase of the disease resembles the condition described as

'haywire'... In the primary or current season stage of the disease, there is considerable variation in the symptom expression. Some varieties exhibit yellowing or purpling of the leaves and stems, associated with stunting, leaf rolling, aerial tuber formation, and wilting. In others there is no definite discoloration except a slight chlorosis of the apical leaves. Infected plants generally show vascular and cortical necrosis of the stolons, roots, and bases of the stem. The bases of infected stalks sometimes disintegrate and exhibit a dark brown or black discoloration somewhat resembling that associated with blackleg. When the bunch-top virus is introduced by grafting to Green Mountain already bearing the leaf roll virus, a severe form of bunch-top is produced. The tubers borne on plants infected with the two viruses show a vascular necrosis of the stolon end of the tuber closely resembling net necrosis. The flesh of the tuber in the region showing this necrosis exhibits a greenish-blue fluorescence under ultra-violet light, similar to that characteristic of the compound known as scopoletin. The bunch-top and leaf roll viruses were recovered from plants showing severe bunch-top symptoms under field conditions and from tubers showing net necrosis borne on such plants. The bunch-top virus also causes a disease in field-grown tomatoes characterized by dwarfing and rigidity of the plant and rolling and purpling of the leaves. This virus has been found also in *Lycium halimifolium, Datura stramonium* and *Nicotiana tabacum* grown under field conditions. A virus resembling the bunch-top virus was also recovered from milkweed (*Asclepias syriaca*).

WITCHES' BROOM OF POTATO IN BRITISH COLUMBIA

N. S. WRIGHT, Dominion Laboratory of Plant Pathology, Vancouver, B.C.

Witches' broom of potato, although of widespread occurrence throughout the world, is apparently of economic importance only in the northwestern states of U.S.A. and in western Canada. Grafting experiments have shown it to be a virus disease but the means by which it is spread in nature has not been determined. The disease is characterized by a general dwarfing and chlorosis of infected plants and the development of abnormally large numbers of axillary branches and small underground tubers.

There is some evidence of a possible relationship between the witches' broom of potato virus and the aster yellows virus.

RECENT EXPERIMENTS IN ENGLAND ON APPLE SCAB CONTROL

R. W. MARSH, Long Ashton Research Station, University of Bristol, England.

Codling moth is not a major pest in England; consequently the programme of post-blossom sprays against apple scab is not dominated by the necessity to apply a succession of insecticidal cover sprays. Applications are more widely spaced than in N. America and an outstanding requirement for a fungicide is tenacity. Under English conditions, phenyl mercury chloride at 0.05 per cent proved approximately of the same fungicidal value as lime sulphur at the standard strength; ferric dimethyldithiocarbamate and tetramethylthiuram disulphide were inferior; a spray of mixed glyoxalidines equalled lime sulphur in apple scab control and caused no damage to sulphur-sensitive varieties.

FUSARIUM STORAGE ROT OF POTATOES

G. W. AYERS, Dominion Laboratory of Plant Pathology, Charlottetown, P.E.I.

Fusarium rot often results in severe storage losses in Prince Edward Island seed and table stock potatoes. Infection was high in 1946 and 1947. Few cases of severe rot occured in the 1948 crop. The storage rot organism *Fusarium sambucinum* f. 6 is at present the only species causing economic losses in stored potatoes. It is commonly present in Prince Edward Island, having been isolated from cultivated, abandoned and woodland soils. Cultural studies have demonstrated considerable variation in spore size and appearance of colonies within the species. Entry to the tuber is made through wounds occurring at harvest or during the later handling of the crop. Preliminary tests indicate more ready ultimate infection when wounded tubers are stored at low temperatures. High initial storage temperatures appear to facilitate rapid drying of wounds and exclusion of the fungus. Temperature tests show slow development of rot at 35°to 40°F. over a 30 day period. At 45° to 50°F. progress of rot is rapid.

Distinct varietal differences in susceptibility have been demonstrated. The varieties Green Mountain and Sebago are highly susceptible. Irish Cobbler is highly resistant.

CORYNEUM BLIGHT OF STONE FRUITS

M. F. WELSH, Dominion Laboratory of Plant Pathology, Summerland, B.C.

Coryneum blight, caused by *Clasterosporium carpophilum* is a severe limiting factor in peach and apricot production in the Canadian Kootenays, producing cankers of limbs and twigs, foliage shot-holing and fruit-spotting.

It has been established that limb and twig infections are initiated during autumn rains, and fruit and foliage infections in spring and early summer. The fungus overwinters at least two seasons in cankers and killed buds.

A spray applied during the third week of September has proved effective in eliminating all cankering in a single season. Development of a spring spray schedule for prevention of fruit and foliage infections has proved less successful; and, therefore, the problem is being investigated further.

SOME ASPECTS OF FOREST PATHOLOGICAL RESEARCH IN BRITISH COLUMBIA

D. C. BUCKLAND, Faculty of Forestry, University of British Columbia, Vancouver, B.C.

Forest pathological research has a number of features dissimilar to those of plant pathology. At present most stress is placed on control of decay in mature and overmature timber in British Columbia. This field of research is quite alien to most plant pathologists. Control of diseases of immature forests, now receiving considerably more attention than it did earlier this decade, relies chiefly on basic plant pathological methods, but involves very long term studies. The only phase of forest pathological research directly comparable to plant pathological work is that of seedling or nursery diseases. Even personnel and equipment problems differ remarkably from those of the plant pathologist.

DETERIORATION OF WESTERN HEMLOCK IN LOOPER KILLED STANDS ON VANCOUVER ISLAND

R. E. FOSTER and D. R. HURN, Dominion Laboratory of Forest Pathology, Victoria, B.C.

Studies were initiated in the summer of 1948 in order to determine the nature and extent of decay losses and the rate of progressive deterioration in stands of hemlock looper-killed timber on lower Vancouver Island.

On the basis of a preliminary sample of 106 dead trees of merchantable size it was found that 98 per cent of the western hemlock had become infected with sap rot subsequent to the insect attack. An average radial penetration of 1.5 inches or 22.4 per cent of the gross merchantable volume has been occupied to date. Six fungi have been identified following intensive cultural studies. The most important of these is *Fomes pinicola.*

THE DEVELOPMENT OF FOREST PATHOLOGY IN BRITISH COLUMBIA

J. E. BIER, Dominion Laboratory of Forest Pathology, Toronto, Ont.

A majority of the timber of commercial size in British Columbia is overmature and subject to appreciable losses from wood-destroying fungi. The first investigations in forest pathology led to a number of practical demonstrations of the economic value of research in forest pathology to the Provincial Forest Service and Industry. Methods were devised to increase the utilization of sound wood from defective trees and to improve the inventories for uncut stands. Additional work of this character was considered vital by the forest interests, with the result that the organization engaged in forest pathology was increased from 2 to 25 persons over a period of less than 5 years.

TRANSMISSION STUDIES ON BACTERIAL WILT OF ALFALFA

M. W. CORMACK, Dominion Laboratory of Plant Pathology, Lethbridge, Alta.

Greenhouse infection tests were made with alfalfa stems, pods, and seeds collected from plants infected to varying degrees with bacterial wilt, and stored under dry conditions. After 3½ years' storage, the stem material still readily transmitted the disease to healthy plants. The organism remained viable for over 2 years in the pods and seeds.

Although seeds from infected plants transmitted the disease when used in inoculum, it has not yet been proven that such seeds will produce diseased plants. Mature, viable seeds are rarely produced by plants that are more than slightly infected. Negative results secured in tests with random samples indicate that seed transmission is relatively uncommon.

DOWNY MILDEW OF ORCHARD GRASS

WALTER JONES, Dominion Laboratory of Plant Pathology, Saanichton, B.C.

The previously unreported downy mildew disease caused by *Selerospora* sp. was first observed in June 1948 in the strain test rows at Saanichton. Symptoms were prevalent on the leaves and inflorescences. In two strains, the grazing potential during the autumn was considered to have been reduced by 80 per cent. Oospores of the fungus were abundantly produced in the leaf tissues, and sporangia were also present on the leaves throughout the season. In the same plot during 1949, sporangia were first observed on the leaves on April 4. Macroscopic symptoms on the leaves are somewhat similar to those of leaf stripe, caused by *Scolecotrichum graminis*. This disease is considered to be potentially dangerous, and seed from infected plants should not be distributed.

THE EFFECT OF TEMPERATURE ON CHLOROTIC BANDING OF CEREALS

T. C. VANTERPOOL, University of Saskatchewan, Saskatoon, Sask.

Chlorotic banding of spring-sown cereal seedlings is frequently encountered in the Prairie Provinces. In some seasons it may be quite extensive and severe. There are three types of severity: yellow, chlorotic banding of the first and second leaves; bleached, dead banding, commonly resulting in a break-over of the leaves; or, complete collapse of the seedlings at soil level. Greening of the chlorotic bands takes a few to 10 days or more. The white-spot or bleached lesions do not recover, but later development of seedlings thus damaged is not noticeably affected. Injury to the growing point is fatal. Observations over a period of many years have shown that these symptoms result when surface-soil temperatures are at or near the freezing point. Conditions prevailing in 1948 indicated that similar effects could be produced by high surface-soil temperatures. It was shown experimentally that chlorosis first appeared when these temperatures reached 42° to 45°C. (108° to 113°F.); the white spot type became more abundant as the temperature rose to 52° C. (125° F.), and collapse and death occured at 52° to 54°C. (125° to 129°F.) and higher. These surface-soil temperatures are common on clear days when air temperatures range from 24° to 35°C. (75° to 95°F.). Thus temperatures at or near the minimum and maximum cardinal points for growth produce the same physiological effects on the development of chlorophyll and its precursors in spring-sown cereal seedlings.

Slightly higher rates of sowing for late-sown cereals should insure against reduction in stand by heat.

Some workers contend that creeping soil particles can produce similar effects, but there is no evidence to support this view.

THE NUTRITION OF PHYTOPHTHORA SPECIES

L. E. LOPATECKI, Branch Laboratory, Division of Chemistry, Saanichton, B.C.

Greater growth of *Phytophthora cactorum* is supported by ammonium than by nitrateions, while growth of *P. parasitica, P. erythroseptica,* and *P. megasperma* is greater with nitrate ions.

Optimum concentrations of glucose and sucrose are 4 per cent for all species. The economic coefficient of each species is independent of both sugar and thiamin concentrations.

Growth of *P. parasitica* bears a linear relationship to thiamin in 1 per cent alanine media, between thiamin concentrations of 0.1 to 0.6 mg. per litre. At lower alanine concentration, the growth-thiamin relationship is linear, but over a smaller range of thiamin concentrations.

The ratio of carbon to nitrogen utilized by *P. parasitica* increases with the thiamin content of the media. This results in a progressive decrease in nitrogen content of the mycelium.

THE EFFECT OF NUTRITIONAL FACTORS ON THE DEVELOPMENT OF OPHIOBOLUS GRAMINIS SACC.

J. D. GILPATRICK, Ontario Agricultural College, Guelph, Ontario and
A. W. HENRY, University of Alberta, Edmonton, Alberta.

Studies on the nutrition of *Ophiobolus graminis* conducted at the University of Alberta confirmed the findings of other workers that biotin is necessary for early growth and thiamin for further mycelial development. Additions of niacin, riboflavin, calcium pantothenate, pyridoxine, folic acid, p-amino benzoic acid, inosotol, and vitamin C, singly and in combination, had no apparent effect on growth. Concentrations of 100 ug. of biotin and 10,000 ug. of thiamin per litre of basic nutrient solution were optimum for mycelial development. Higher concentrations of biotin inhibited growth. Aspartic acid substituted for biotin as a growth substance.

Diluting nutrients while holding the concentrations of vitamins constant reduced growth considerably.

Of several carbohydrates tested, maltose was the best source for growth and inulin the poorest. Dextrose at the rate of 2 per cent was optimum but a wide range of concentrations was satisfactory.

O. graminis has specific nitrogen requirements. Peptone and asparagine were the best sources of those tested. D-glumatic acid was more effective than twelve other amino acids, supplied singly or as a mixture. $NaNO_3$ induced more growth than several of these acids.

Perithecia did not develop in any medium although cultures were incubated for 8 weeks under conditions of high humidity, relatively cool temperatures (15° - 20°C.), and in the natural light of the greenhouse.

Small, black, sterile bodies, similar in shape and size to perithecia, were formed with $NaNO_3$ or dl-serine as a nitrogen source, when biotin, thiamin and other nutrients were in high concentration.

A proper balance between several factors is probably required by this organism for the initiation of fruiting.

RESULTS OF COOPERATIVE TESTS WITH NEW SEED TREATMENTS

J. E. MACHACEK, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

Many fungicidal preparations have been cooperatively tested in recent years for their value as seed treatments. These fungicides, to be used as dusts, slurries, or wet treatments fell into three groups, fungicides, mixtures of fungicides and vitamins, and mixtures of fungicides and insecticides. The materials received were subjected first to laboratory and greenhouse screening tests, then to local field tests, and finally to international or zonal field tests.

Of the new materials tried, Ceresan M., Lunasan (R118A), Panogen, and a number of unnamed preparations proved to be good all round treatments. Others were selective in their action and had a lesser use. In general, phytotoxicity was of a low order.

SEED-BORNE FUNGI OF VEGETABLES

J. W. GROVES, Division of Botany and Plant Pathology,
Central Experimental Farm, Ottawa.

Studies of the fungus flora of agricultural seeds have been carried on over a period of 10 years. From 15 common vegetable seeds a total of 148 species of fungi have been identified. These fungi are discussed in relation to their frequency of occurrence, host range, and pathogenicity.

TETRAMETHYLTHIURAM DISULPHIDE, AN EFFECTIVE SOIL FUNGICIDE

L. W. KOCH, A. A. HILDEBRAND and C. D. McKEEN, Dominion Laboratory of Plant Pathology, Harrow, Ontario.

In extensive greenhouse tests involving numerous chemicals for control of black root of sugar beets, tetramethylthiruam disulphide (50 per cent non-wettable) applied at the rate of 3 to 4 lb. per acre consistently proved by far the most effective of the chemicals tested in reducing pre- and post-emergence attack. Field tests on a practical basis over a 2-year period confirmed greenhouse tests, with increase in sugar beet seedling stands ranging from 22 to 239 per cent. In 1948 increases in yield were correlated with increased early stands of seedlings in the Arasan-treated soil.

A combined seed and soil treatment with Arasan was found to control effectively damping-off of pepper, Spanish onion and spinach seedlings. Similar treatment proved toxic for lettuce and certain other vegetables.

LABORATORY METHODS OF ESTIMATING THE RESISTANCE OF WHEAT VARIETIES TO ROOT ROT INFECTION

L. E. TYNER, Dominion Laboratory of Plant Pathology, Edmonton, Alta.

The catalase content of six-day-old seedlings was measured manometrically and the the data were correlated with the infection rating data secured from field plantings. Varieties that were definitely resistant to root rot in the field were, in general, high in catalase, and, conversely, those definitely susceptible under field test were low in catalase.

CROWN ROT OF APPLE — RESISTANCE TRIALS

F. C. MELLOR, Dominion Laboratory of Plant Pathology, Vancouver, B.C.

Artificial inoculation of close to 3,000 apple trees representing 54 varieties has shown that there is a wide range in varietal susceptibility to attack by *Phytophthora cactorum*. The trees used included seedlings on which different varieties had been grafted, clonal roots, own-rooted trees, and trees in which the inoculations were made above the stock-scion junction. Varieties ranged from very susceptible, such as Winter St. Lawrence, in which 24 trees were badly rotted, of 28 inoculated, to practically immune, such as Antonovka in which only 2 of 212 trees became seriously affected.

FUNGISTATIC VALUE OF THE DITHIOCARBAMATES AND THEIR SIGNIFICANCE

WILLIAM NEWTON, Dominion Laboratory of Plant Pathology, Saanichton, B.C.

The fungistatic value of disodium ethylene bisdithiocarbamate (Dithane) is greatly reduced by heating in water, and that of Fermate and Zerlate is only slightly reduced by the same treatment. This evidence, together with the relative fungistatic values of eight dithiocarbamate salts, has suggested the existence of a direct relationship between initial fungistatic value and period of effectiveness on foliage as a spray material.

The fungistatic values are related to the ability of the compounds to decolorize starch-iodine agar, supporting the theory that the evolution of H_2S accounts for the fungistatic values of these compounds.

SWOLLEN SHOOT OF COCOA IN THE GOLD COAST

G. H. BERKELEY, Dominion Laboratory of Plant Pathology, St. Catharines, Ont.

THE UNEVEN DISTRIBUTION OF VIRUSES IN POTATO TUBERS

J. C. PERRAULT, Dominion Laboratory of Plant Pathology, Ste. Anne de la Pocatiere, Que.

Observations made over a number of years have shown that viruses are not always evenly distributed in potato tubers. When all the eyes from supposedly mosaic-infected tubers are cut out and planted, varying percentages of these eyes may produce healthy plants. The severity of the symptoms may also vary in plants cut out of the same tuber and one may get all types of symptoms varying between super mild and rugose or extremely severe mosaic. There is no correlation between the location of the eyes on the tuber and the severity of the symptoms on the plants originating from these eyes. Leaf-roll affected tubers have very seldom produced healthy plants under climatic conditions of the Lower St. Lawrence.

CLUB ROOT STUDIES. ROOT HAIR INFECTION IN SWEDES AND OTHER CRUCIFERS

G. W. AYERS, Dominion Laboratory of Plant Pathology, Charlottetown, P.E.I.

The club root organism, *Plasmodiophora Brassicae*, infects with equal facility the root hairs of club root resistant and susceptible swedes. The biflagellate and heterokont zoospores from the resting spores come in contact with root hairs and penetrate to form young thalli within the host cell. Later the protoplasm undergoes cleavage and an irregular cluster of zoosporangia is formed. Each zoosporangium contains 4 to 8 zoospores which at maturity are discharged from the root hair if free moisture is present. Discharge takes place through small openings at the point of contact of the zoosporangia with the cell wall of the root hair. These zoospores are also biflagellate and heterokont. Equal root hair infection in susceptible and resistent swedes indicates resistance is not carrid in root hairs and further indicates that the fungus is utilizing hoot hairs as a means of self propagation. Root hair infection was studied in 16 different cruciferous plants in an attempt to find a host highly suitable for zoosporangial studies. Pepper grass, *Lepidium densiflorum*, is superior to other plants tested.

PATHOGENICITY TESTS OF ISOLATES OF HELMINTHOSPORIUM SATIVUM ON WHEAT VARIETIES

B. J. SALLANS and R. D. TINLINE, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

A series of laboratory tests, using 8 to 56 isolates of *Helminthosporium sativum* and 8 varieties of wheat in all, was made to study the interaction of isolates on varieties. It was found that varieties tend to react similarly to the various isolates used in the tests. This held true although varietal differences were quite evident and isolates possessed varying degrees of pathogenicity. Thus it appears that in testing wheat varieties for resistance to *H. sativum* it may be necessary to use only one or two isolates known to be definitely pathogenic. This is important since some isolates appear to change, from time to time, in their capacity to produce disease.

THE PERITHECIAL STAGE OF HELMINTHOSPORIUM SATIVUM

R. D. TINLINE, B. J. SALLANS and P.M. SIMMONDS, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

Although *Helminthosporium sativum* is an important cause of disease in cereals in some parts of the world and has been studied by many observers, no report of the perfect stage seems to have appeared since Ito and Kuribayashi described *Ophiobolus sativus* from laboratory cultures in 1929.

Using 56 monoconidial isolates obtained from widely separated locations in Saskatchewan and growing them under a variety of conditions, and on various media, perithecia with mature ascospores were obtained. They occurred in cultures where certain isolates were paired. Of the possible pairings between 56 isolates three pairings resulted in the formation of ascospores. Two unpaired isolates formed perithecium-like structures, but no ascospores were produced.

STRAWBERRY VIRUS PROBLEMS IN BRITISH COLUMBIA

R. E. FITZPATRICK and F. C. MELLOR, Dominion Laboratory of Plant Pathology, Vancouver, B.C.

The yellows-crinkle virus complex, although a serious problem in the Marshall variety in the State of Washington, has not as yet been recognized under field conditions on British Sovereign, the variety which is most extensively grown in B.C. Grafting experiments have shown British Sovereign to be susceptible to the disease, although symptoms are not as striking as in Marshall and could readily be mistaken for root injury or unfavorable growing conditions.

SIXTY YEARS OF PLANT DISEASE IN THE OKANAGAN

H. R. McLARTY, Dominion Laboratory of Plant Pathology, Summerland, B.C.

The paper reviews the plant disease situation in the Okanagan Valley during the life period of the British Columbia Fruit Growers' Association. The history is divided into 6 decades and the outstanding developments of each decade are featured.

The first deals with the pioneer phases when trials were made to see if trees would grow in this area, the second with the planting era and the early attempts at plant disease control, the third with the fight against fire blight, the fourth the establishment of the Dominion Laboratory of Plant Pathology and the Okanagan Agricultural Club, and the undertaking of many experiments on various economic diseases, the fifth the conquering of drought spot, die-back, and corky core, and the sixth with the introduction of new fungicides and spray machines and the fight against the viruses. The paper concludes with the observation that in so far as plant diseases are concerned, "the record of the past warrants confidence in the future".

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